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The Effect of Gadget Use on Students' Mathematics Learning Outcomes

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ABSTRACT

This study aims to determine the effect of gadget use on the mathematics learning outcomes of junior high school students. This research employs a quantitative approach. The sampling technique used in this study is the Saturated Sampling Technique. The data collection techniques include documentation and questionnaires. The data analysis techniques used are simple linear regression and t-test. The results of this study show a simple regression equation of Y = 34,156 + 0,433X, which means that if there is no gadget use at all, the predicted value of students' mathematics learning outcomes is 34.156. Furthermore, for every one-unit increase in gadget use, there is a 0.433 increase in students' mathematics learning outcomes. In addition, based on the hypothesis testing results, the value of $t_{count} > t_{table}$ or 2,696 > 2,048, which means that H0 is rejected and Ha is accepted, indicating that the regression coefficient is statistically significant. Therefore, it is proven that gadget use has an effect on the learning outcomes of students at *SMP Negeri 1 Waikabubak*.

Keywords: Influence; Gadget Use; Mathematics Learning Outcomes

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1. INTRODUCTION

The development of Information and Communication Technology (ICT) has brought significant changes to various aspects of life, including the field of education. One manifestation of ICT advancement is the widespread use of gadgets such as smartphones, tablets, and laptops, which are increasingly accessible to people of all ages, including students. Gadgets offer a variety of appealing features, ranging from interactive games to educational applications that are believed to support children's cognitive development (Hisyam & Pamungkas, 2016; Nugroho, 2020).

In this digital era, gadgets have become an inseparable part of students' daily lives. Gadgets present two contrasting sides. On one hand, they have great potential as learning tools, as they provide quick access to information sources, interactive learning applications, and educational videos that support students' understanding. When used appropriately, gadgets can help students complete assignments, understand difficult concepts, and broaden their knowledge beyond the material delivered by teachers in the classroom. On the other hand, excessive use of gadgets by students often leads to problems in the learning process (Rahmatia & Azis, 2024). Students do not always use gadgets to access information related to their studies (Padmadewi et al., 2018). Instead, they tend to use them for playing games or accessing social media rather than utilizing them as learning tools. Uncontrolled and excessive gadget use can disrupt students' learning activities, particularly in mathematics.

Mathematics itself is often perceived as a difficult subject due to its abstract, logical, and systematic nature, as well as its use of symbols and formulas that can be confusing (Mustakim, 2020). Success in learning mathematics requires deep conceptual understanding, logical thinking skills, and consistent practice. Spending too much time in front of screens can also disrupt students' sleep patterns, which negatively affects memory consolidation and the learning process (Setiadi et al., 2024). As a result, students' mathematics learning outcomes may not be optimal.

SMP Negeri 1 *Waikabubak* is a junior high school located in West Sumba Regency. Based on observations, the school allows students to bring and use gadgets during the learning process. This policy aims to facilitate material evaluation, encourage independent learning, and support students in developing their understanding both at school and at home. However, in reality, not all students are able to utilize gadgets optimally for academic purposes. Many students still use gadgets primarily for entertainment, meaning their potential as learning media has not been fully maximized.

Based on these conditions, this study is important to examine the effect of gadget use on students' mathematics learning outcomes at the junior high school level. This research is expected to contribute to guiding more productive use of gadgets so that they can serve as effective tools to support mathematics learning.

2. METHODS

The type of research used in this study is quantitative research. Quantitative research is an approach used to test a theory by measuring several variables involved (Creswell, 2023). The population in this study consisted of all students of class VII A at *SMP Negeri* 1 *Waikabubak*, totaling 30 students. The sample included all 30 students, representing the entire population. The sampling technique used in this study was total sampling.

The data collection techniques included documentation and a questionnaire. Documentation was used to obtain data on students' mathematics learning outcomes in the form of Final Semester Examination (UAS) scores. Meanwhile, the questionnaire was used to collect data on gadget usage. The questionnaire consisted of 30 statement items that were adjusted to the research indicators, including (Kontesa, 2022): (1) the utilization of functions and applications available on gadgets, (2) frequency of gadget use, (3) duration of gadget use, and (4) the impact of gadget use.

Before being distributed to the research sample, the questionnaire was tested for validity and reliability using SPSS 25. Based on the validity test results, 25 items were found to be valid, while 5 items were invalid, namely items number 2, 10, 18, 25, and 29.

3. RESULT AND DISCUSSION

3.1 Result

a. Prerequisite Tests for Data Analysis

Before conducting data analysis using simple linear regression, the data must first meet the prerequisite tests or classical assumption tests, namely the normality test, linearity test, and heteroscedasticity test.

1) Normality Test

The normality test is used to determine whether the data obtained are normally distributed (Ikha Yulianti & Yi' Tsabit, 2023). The criterion for normality is that if the significance value of the test result is greater than 0.05, the variable is considered to be normally distributed; otherwise, it is not (Maria Malo & Lidia Lali Momo, 2024).

Table 1. Normality Test Results

Variable	Test Statistic	Significance Value (Asymp. Sig. 2-tailed)	α (Significance)	Conclusion
Gadget Use	0,935	0,068	0,05	Normally distributed
Mathematics Learning Outcomes	0,979	0,787	0,05	Normally distributed

Based on the results of the Kolmogorov–Smirnov normality test presented in Table 1, the significance value for the gadget usage variable is 0.068 > 0.05, and for the mathematics learning outcomes variable is 0.787 > 0.05. Therefore, it can be concluded that both the gadget usage and mathematics learning outcomes variables are normally distributed.

2) Linearity Test

The linearity test is conducted to determine the relationship between the independent variable and the dependent variable (Meilawati et al., 2021). The relationship is considered linear if the significance value is greater than 0.05. The results of the linearity test are presented in Table 2 below:

Table 2. Linearity Test Results

F-value	Significance (Sig.)	α (Significance)	Conclusion
2.185	0.082	0.05	Linear

Based on the test results, the significance value is 0.082 > 0.05. Therefore, it can be concluded that there is a linear relationship between gadget usage and students' learning outcomes

3) Heteroscedasticity Test

The heteroscedasticity test is conducted to examine whether there is a variance inequality of residuals across observations in the regression model. The decision criterion is that if the significance value (Sig.) is greater than 0.05, there is no indication of heteroscedasticity; conversely, if the significance value is less than 0.05, heteroscedasticity is present (Duli, 2020).

Table 3. Heteroscedasticity Test Results

Independent Variable	B	t-value	Sig. (p-value)	Conclusion
Gadget Usage	-0.078	-0.844	0.406	No heteroscedasticity detected

Based on Table 3, the significance value is 0.406 > 0.05. Therefore, it can be concluded that there is no heteroscedasticity in the regression model.

b. Hypothesis Testing

1) T-test

The t-test in regression analysis is used to examine the significance of the regression coefficient, namely to determine whether the independent variable (X), gadget usage, has a significant effect on the dependent variable (Y), mathematics learning outcomes, in the proposed model. The hypotheses are formulated as follows:

H_a: There is a significant effect of gadget usage on mathematics learning outcomes.
H_0: There is no significant effect of gadget usage on mathematics learning outcomes.
The results of the t-test analysis are presented in Table 4 below:

Table 4. t-Test Results (Coefficients[a])

Model		*Unstandardized Coefficients*		*Standardized Coefficients*	t	Sig.
	Variables	B	*Std. Error*	*Beta*		
1	(Constant)	34.158	13.138		2.600	.015
	Gadget Usage	.433	.161	.454	2.696	.012

a) **Dependent Variable: Mathematics Learning Outcomes**

Based on Table 4, the simple linear regression equation is Y = 34.158 + 0.433X This equation indicates that the constant value of 34.158 represents the predicted value of mathematics learning outcomes when gadget usage is zero. In other words, if there is no gadget usage, the predicted mathematics learning outcome score is 34.158. Furthermore, the regression coefficient of 0.433 indicates that each one-unit increase in gadget usage leads to an increase of 0.433 in students' mathematics learning outcomes.

In addition, the significance value is 0.012 < 0.05, and the $t_{\text{-value}}$ is greater than the $t_{\text{-table}}$ value (2.696 > 2.048). Therefore, it can be concluded that gadget usage has a significant effect on students' mathematics learning outcomes.

Table 5. Coefficient of Determination (Model Summary)

Model	R	*R Square*	*Adjusted R Square*	*Std. Error of the Estimate*
1	0,454[a]	0,206	0,178	7,791

b) **Predictors: (Constant), Gadget Usage**

Based on Table 5, the coefficient of determination (R Square) is 0.206. This indicates that gadget usage contributes **20.6%** to the variation in mathematics learning outcomes. In other words, gadget usage has an effect of 20.6% on students' mathematics learning outcomes, while the remaining **79.4%** is influenced by other factors not examined in this study.

3.2 Discussion

Based on the results of the simple linear regression analysis, the calculated $t_{\text{-value}}$ is 2.696. This indicates that the $t_{\text{-value}}$ is greater than the $t_{\text{-table}}$ value (2.696 > 2.048), and the significance value (Sig. 2-tailed) is less than the alpha level (0.012 < 0.05). Therefore, it can be concluded that gadget usage has a significant effect on the mathematics learning outcomes of seventh-grade students at *SMP Negeri* 1 *Waikabubak*. Thus, the alternative hypothesis (H_a), which states that there is a significant effect of gadget usage on students' mathematics learning outcomes, is accepted, while the null hypothesis (H_0) is rejected.

This finding implies that the higher the intensity or quality of positive gadget use such as accessing learning materials, instructional videos, or educational applications the higher the students' mathematics learning outcomes. Furthermore, based on the coefficient of determination test, the R Square value is 0.206, indicating that gadget usage accounts for 20.6% of the variance in mathematics learning outcomes, while the remaining 79.4% is influenced by other factors not examined in this study.

The results of this study are consistent with previous research. Rahmatia & Aziz (2024) found that gadget usage has a significant effect on students' academic achievement, with gadget usage

categorized as high. Similarly, Hastin et al. (2022) reported that gadget usage (X) significantly affects students' learning outcomes (Y) at *SDN* 05 *Tilango*. In addition, Madarcos et al. (2024) revealed that gadget usage is positively and significantly correlated with academic achievement, suggesting that both the frequency and manner of gadget use may influence academic success. Therefore, the findings of this study support previous research, confirming that gadgets can serve as effective tools in supporting the learning process.

This study reinforces the view that gadgets do not merely have negative impacts but also hold significant potential as learning media that can enhance students' learning outcomes when used appropriately. Therefore, it is important for teachers and parents to guide students in using gadgets wisely and productively to support the learning process, particularly in mathematics.

4. CONCLUSION

Based on the results of the study, it can be concluded that gadget usage has a positive and significant effect on the mathematics learning outcomes of students at *SMP Negeri* 1 *Waikabubak*. This indicates that the appropriate use of gadgets can support the learning process. Gadget usage facilitates students in accessing learning materials, practicing problem-solving, and obtaining relevant information related to mathematics.

The use of gadgets directed toward learning activities can improve students' learning outcomes, particularly in mathematics. However, this study has several limitations. It only examines one independent variable, namely gadget usage, which does not fully represent other factors that may influence mathematics learning outcomes, such as learning motivation, learning environment, and teachers' instructional strategies. In addition, this study was conducted in only one school with a limited sample size, which may restrict the generalizability of the findings to broader contexts.

The findings of this study can serve as a reference for teachers and parents to be more attentive in guiding students in using gadgets, so that their use can better support the learning process and improve learning outcomes. Future research is recommended to include more relevant variables and to expand the population and sample size in order to obtain more comprehensive results.

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